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Knowledge, Practice, and Attitude of Medical Students on Probiotics

Sana'a, 2023.

A Graduation Project Submitted for Partial Fulfillment of Bachelor's Degree in
Clinical Nutrition & Dietetics

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Sana'a 2023

ACKNOWLEDGEMENT

We would like to express our best gratitude and appreciation to our supervisor Dr. Sadeq Al-Sheraji for his good supervision and guiding. He preserved no effort helping us. He gave us much of his valuable time to make this work possible.

Our thanks also extended to Dr. Mansour Ghaleb the head of department for his efforts and facilitation he made for us to complete this research.

We also would like to thank all lecturers and academic staff in UST.

Last but not least, we would like to acknowledge all students for their cooperativeness during data gathering.

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LIST OF ABBREVIATIONS

CNS: Central nervous system

ENS: Enteric nervous system

FAO/UN: Food and Agriculture Organization of the United Nations

TLRs: Toll receptors

UST: University of Science and Technology

SPSS: Statistical Package of Social Sciences

WHO: World Health Organization

ABSTRACT

Background:

During the last two decades probiotic bacteria have become increasingly popular as a result of accumulation of scientific evidence pointing to their beneficial effects on human health. The probiotics have been incorporated in various products, mainly fermented dairy foods. However, knowledge and practice on probiotics expected to be low among Yemeni population including university students due to limited exposure to probiotic information.

Objective:

To determine knowledge, attitude, and practice of students in medical programs regarding probiotics.

Methods and materials:

It is a cross-sectional, questionnaire-based, descriptive study. The questionnaire was prepared relying on literature review and on study objectives. An internet-based copy of the questionnaire was prepared using Google forms and sent to students through Whats up.

The questionnaire included questions related to demographic data, a question related to background awareness (hearing about probiotics), 5 questions to evaluate students' knowledge about probiotics, 3 questions to evaluate students' knowledge about prebiotics, 4 questions to evaluate students' attitude towards probiotics, and 4 questions to evaluate students' practice towards probiotics. SPSS software was used for data analysis.

Results:

The study included 536 students of different medical sciences. Females respondents represented the majority (55.4%), and most of students (75.9%) are in the age group between 20 and 25 years. They are distributed among different specialties which are dentistry (29.3%), medicine (22.8%), laboratories (21.8%), and pharmacy (17.9%). Other specialties include nursing (6.3%), and radiology (1.9%). They are mainly distributed in second, third, and fourth

study levels in rates of 32.1%, 28.5%, and 15.1% respectively. Fewer students are in first, fifth, and sixth levels who represented 8.8%, 12.9%, and 2.6% respectively.

The overall awareness is not high as only 67.2% of students already heard about probiotics. The main sources of information are lectures (39.9%) and physicians (13.6%), followed by websites (7.5%) and social media (6.2%). Level of awareness becomes better when adding a definition for the term probiotics as beneficial bacteria (8.4% before vs 58.8% after). Females have higher level of awareness than males (42.5% vs 24.6%) without significant difference. The age also did not affect level of awareness. However, specialty seems to influence level of awareness because it is significantly higher among students in dentistry (21.1%), medicine (16%), and pharmacy (12.9%) than other specialties.

Results revealed that only 55% of students know correct answer about nature of probiotics which is living organisms, 52.2% correctly answered that the main source of probiotics is dairy products, and only 25% think that probiotics can be beneficial in diseases of diabetes, hypertension, indigestion, and immunity problems. Results also revealed that most of students are not familiar with the term prebiotic because only 15.9% of them heard about the term prebiotics.

Regarding attitude, 58.2% think that probiotics have health benefits, 34% think that they are good for oral health, and 38.2% intend to advise their patients to use probiotics. Regarding practice toward probiotics, 52.2% mentioned that they take food rich with probiotics, but only 13.6% take them in daily manner. These findings indicate poor practices

Conclusions

In conclusion, this study highlights awareness of students in medical programs about probiotics. It revealed that the awareness is not high. Knowledge, attitude, and practice on probiotics are relatively low. Specialty program is a predictor that influence awareness and knowledge of students.

It is recommended for more health education using available media to address information about probiotic products as well as to promote the increased awareness of probiotic consumption. In addition, topic of probiotics should be incorporated in the university curriculum of all medical programs. Further studies are recommended for identification of weak aspects in knowledge and practice, which will help in developing educational materials for students about probiotics.

Keywords: probiotics, beneficial bacteria, dairy products, microorganisms, lactobacillus, bifidobacterium, knowledge, attitude, practice, medical students.

CHAPTER 1: INTRODUCTION

1.1. Background

Food is important in maintaining human metabolic requirement. Improving the food contents seems to be very useful; thus, scientists had come out with several beneficial ideas.^[1]

One of the ideas was creating foods that have special functional properties that can improve the human health and even prevent diseases. This kind of food is called as functional foods. In general, functional foods can be defined as healthy foods with health-promoting and/or disease preventing properties beyond the traditional and basic nutrients such as vitamins and minerals.^[2]

In the developed countries, functional foods are accepted and highly consumed.^[3] However, functional foods are still not widely spread in markets of developing countries.^[4]

There were several types of functional foods for examples bread (fiber-rich with fatty acids and omega 3), fruit juices (probiotic with vitamins or minerals), biscuits (added with oat, low cholesterol, low fat, and less sugar), cereal (oatmeal with beta-glucan with added vitamins and minerals and low fat) and many more. One of the major components of functional food is probiotic. Probiotic foods are foods that contain probiotic bacteria and provide health benefits to human.^[5]

The concept of adding probiotics into foods is not to remove harmful components but rather to add a beneficial component to the diet. Examples of variety types of probiotic foods are yoghurt, kombucha tea (fermented tea), miso soup, soy milk, kefir, sauerkraut, milk, dark chocolate, microalgae, pickles, tempeh, kimchi, and olives in brine.^[3]

The benefits of probiotics have been reported in various studies includes balancing the intestinal flora by reducing the lactose intolerance and indigestion, reducing cholesterol levels, helping in synthesis of B complex vitamins, and preventing cancer development.^[6]

1.2. Justification

Despite numerous evidences available in scientific and nutritional journals on the benefits of probiotic, Yemeni consumers are still unaware with probiotics and their importance for health. Using of probiotics is not so popular among Yemeni people. This was because Yemeni people have limited exposure to probiotic information. As a part of community, Yemeni students can also be considered as one of the consumers that would probably take the probiotics and also provide the health information to public and patients in the future. Therefore, students in medical specialties should have essential knowledge.

1.3. Importance of study

To the best of our knowledge, there is no published study regarding knowledge, attitude, and practice on probiotics among university students or other populations in Yemen. Thus, the study will highlight awareness and enhances students' knowledge, attitude, and practices on probiotics.

1.4. Hypothesis of the study:

- Null hypothesis (H_0): knowledge, attitude, and practices towards probiotics among medical students are low.

- Alternative hypothesis (H_1): knowledge, attitude, and practices towards probiotics among medical students are good.

1.5. Objectives of the study

1.5.1. General objective

To determine knowledge, attitude, and practice of students in medical programs regarding probiotics.

1.5.2. Specific objectives:

- 1.5.2.1. To describe students' socio-demographic characteristics (gender, age, study program, and study level).
- 1.5.2.2. To determine awareness on probiotics with and without adding the definition.
- 1.5.2.3. To assess association between awareness on probiotics and other demographic variables.
- 1.5.2.4. To determine source of information about probiotics.
- 1.5.2.5. To determine knowledge of students regarding nature, sources, uses, and benefits of probiotics as well as prebiotics.
- 1.5.2.6. To determine attitude of students towards using and prescription probiotics.
- 1.5.2.7. To explore proportion of students who already used probiotics.

CHAPTER 2: LITERATURE REVIEW

2.1. Definitions

Etymologically the term probiotic is derived from the Greek language meaning "for life" but the definition of probiotics has evolved over time simultaneously with the increasing interest in the use of viable bacterial supplements and in relation to the progress made in understanding their mechanisms of action.^[7] The term was originally used to describe substances produced by one microorganism that stimulated the growth of others and was later used to describe tissue extracts that stimulated microbial growth and animal feed supplements exerting a beneficial effect on animals by contributing to their intestinal flora balance.^[8] Until recently the most widely used definition which contributed to the development of the probiotic concept in several ways was that of Fuller: "probiotics are live microbial feed supplements which beneficially affect the host animal by improving microbial balance".^[9] The definition used at present was given by the Food and Agriculture Organization of the United Nations World Health Organization (FAO/WHO) according to which probiotics are redefined as "live microorganisms which when administered in adequate amounts confer a health benefit on the host". In relation to food the definition can be adjusted by emphasizing that the beneficial effect is exerted by the microorganisms "when consumed in adequate amounts as part of food".^[10]

2.2. Historical perspective

The association of probiotics with well-being has a long history. More than a century has passed since Tissier observed that gut microbiota from healthy breast fed infants were dominated by rods with a bifid shape (bifidobacteria) which were absent from formula fed

infants suffering from diarrhea, establishing the concept that they played a role in maintaining health.^[7]

Historically, in 1907, a Russian scientist called Elie Metchnikoff was the first scientist who came to the idea that the gut flora can be modified and harmful microbes replaced with beneficial ones.^[11] In 1953, the term probiotics was introduced by the German scientist Werner Kollath to designate “active substances that are essential for a healthy development of life.” In 1965, this term was used by Lilly and Stillwell in a different context to describe substances secreted by one organism which stimulate the growth of another.^[11-13] In 1995, the term prebiotics was introduced by Gibson and Rober-froid to describe food supplements that are nondigestible by the host but are able to exert beneficial effects by selective stimulation of growth or activity of microorganisms that are present in the intestine. Prebiotic substances are not hydrolyzed nor absorbed in the gastrointestinal tract but are available as substrates for probiotics and the most commonly used ones at present are nondigestible fructooligosaccharides.^[14] For practical reasons the combination of probiotics and prebiotics has been described as conbiotics by certain authors and as symbiotics by others.^[14-16]

Since then a series of studies have supported this association, and by time, they have successfully evolved with the more evidence that probiotic bacteria can contribute to human health. These data paved the way for the emergence of “functional food” concept.^[7]

The functional food market is expanding, especially in Japan-its birthplace-with further growth prospects in Europe and the United States and in most countries the largest share of its products is held by probiotics.^[3]

2.3. Spectrum of probiotics use

Recently, probiotics gained the attention of clinicians for their use in the prevention and treatment of multiple diseases.^[7]

During the past years, the use of probiotic microorganisms has been applied to modulate the microbiome in a beneficial way and thus fighting against infections threatening human and animal health.^[9] Their use might sometimes be an alternative to antibiotics permitting to reduce antimicrobial resistance due to the overuse or misuse of antibiotics against infections.^[17,18] Spreading of antibiotic resistance is a major public health problem among human pathogens.^[17] The development of antibiotic resistance through different mechanisms may result in unsuccessful treatment of infectious diseases.^[19] Table (1.1) illustrates some of clinical conditions that can benefit from use of probiotics.

Table 1. 1. Use of probiotics in treatment of some diseases

Clinical conditions	Use of probiotics in different diseases
Use of probiotics in Gastrointestinal disorders:	<ul style="list-style-type: none"> - Gastroenteritis - Antibiotic associated diarrhea and traveler’s diarrhea - Clostridioides difficile infection - Inflammatory bowel disease - Celiac disease - Helicobacter pylori infection - Lactose Intolerance
Use of probiotics in allergy:	<ul style="list-style-type: none"> - Atopic dermatitis - Allergic rhinitis - Atopic eczema
Use of probiotics in respiratory diseases:	<ul style="list-style-type: none"> - Asthma - Cystic fibrosis - Respiratory infections (global)
Use of probiotics in neurological and psychiatric diseases:	<ul style="list-style-type: none"> - Neurological and psychiatric diseases - Autism Spectrum Disorder (ASD) - Autoimmune myasthenia gravis - Autoimmune Encephalomyelitis
Use of probiotics in Liver diseases:	<ul style="list-style-type: none"> - Liver cirrhosis - Hepatic encephalopathy

Use of probiotics in Genito-Urinary tract infections:	<ul style="list-style-type: none"> - Bacterial vaginosis - Gardnerella vaginalis Urinary tract infections
Use of probiotics in metabolic syndrome and cardiovascular diseases:	<ul style="list-style-type: none"> - Diabetes - Obesity - Cardiovascular disease and cholesterol
Use of probiotics in cancer and cancer cellular lines:	<ul style="list-style-type: none"> - Tumor cell apoptosis - Inhibition of human colon cancer cell lines including HT-29, SW 480, Caco-2 Antiproliferative and pro-apoptotic effects in human gastric cancer cells and colonic cancer cells - Antitumor activities
Decrease bone mineralization:	<ul style="list-style-type: none"> - Osteoporosis
Use of probiotics in autoimmune diseases:	<ul style="list-style-type: none"> - Sjogren's syndrome, Rheumatoid arthritis, Systemic lupus erythematosus, Multiple sclerosis
Use of probiotics in oral diseases:	<ul style="list-style-type: none"> - Gingivitis, Periodontitis, Dental caries - Halitosis - Oral candidiasis
Use of probiotics as vaccine adjuvant:	<ul style="list-style-type: none"> - Vaccine adjuvant - Adjuvant to flu vaccine

Source: Stavropoulou, 2020.^[19]

2.4. Sources of probiotics

The mainly frequent species of probiotics are accessible in dairy products and probiotic-fortified foods. Nevertheless, tablets, capsules, powdered and sachets holding the probiotic in lyophilized type are obtainable.^[20]

Nowadays, different types of probiotic bacteria are added to a wide variety of foods as a functional food including cheese, ice cream, milk-based desserts and fermented foods of plant origin, fruit juices, vegetables, legumes and cereals, malt and soybeans.^[21]

2.5. Probiotics bacterial genera

Lactobacillus and Bifidobacterium genera are principally reported as probiotics. These bacterial genera are isolated in the human intestine in considerable populations. Lactobacillus includes different species with the most semantic as probiotics; *L. acidophilus*, *L. rhamnosus*, *L. bulgaricus*, *L. reuteri*, *L. casei*, *L. johnsonii*, *L. plantarum*. These strains are acid-tolerant in the stomach acidity and have a good adherence capacity to the intestinal cells. Bifidobacterium belong to the phylum of Actinobacteria as they have a characteristic ramified morphology. The most common Bifidobacterium probiotic species are *B. animalis*, *B. bifidum*, *B. breve*, *B. infantis*, *B. lactis*, *B. longum*. *Streptococcus thermophilus*, *Enterococcus faecalis*, *Enterococcus faecium*, *Pediococcus*, and several Bacilli, as well as the yeasts *Saccharomyces boulardii* and *Saccharomyces cerevisiae* also show some probiotic properties.^[19]

2.6. Mechanism of action of probiotics

Probiotics main mechanisms of action include enhanced mucosal barrier function, direct antagonism with pathogens, inhibition of bacterial adherence and invasion capacity in the intestinal epithelium, boosting of the immune system and regulation of the central nervous system.^[19] It is accepted that there is a mutual communication between the gut microbiota and the liver, the so-called "microbiota-gut-liver axis" as well as a reciprocal communication between the intestinal microbiota and the central nervous system through the "microbiota-gut-brain axis." Moreover, recently the "gut-lung axis" in bacterial and viral infections is considerably discussed for bacterial and viral infections, as the intestinal microbiota amplifies the alveolar macrophage activity having a protective role in the host defense against pneumonia. To date, stronger data in favor of their clinical use are provided in the prevention

of gastrointestinal disorders, antibiotic-associated diarrhea, allergy and respiratory infections.^[19]

The following are some proposed mechanisms of action of probiotics (figure 1.1):

- Competition for space (Spatial arrangement theory) in the intestinal lumen and wall.^[22]
- Antagonism between pathogenic bacteria and probiotics which is produced by competition for nutrients or by pH modulation.^[22]
- Synthesis of nutrients reported as sources for energy for epithelial cells or bacteria.^[22]
- Maintenance of mucosal integrity. Probiotics show a cytoprotective action upon the gastric mucosa integrity by strengthening the epithelial junctions and preserving the mucosal barrier function.^[23]
- Regulation of gut motility. Intestinal motility as well as reflexes and secretory functions of the gastrointestinal tract are regulated by the Enteric Nervous System (ENS) found in the intestinal wall. The CNS affects the microbiota by altering the motility and permeability of the gut or even via mediators secreted by neuro-endocrine cells.^[24]
- Prevention of osteoporosis. Studies showed that probiotic supplementation can both increase bone density and protect against primary (estrogen-deficiency) and secondary osteoporosis.^[24]
- Hypocholestaemic action as deconjugation of bile acids, assimilation of endogenous or exogenous cholesterol, binding of cholesterol and free bile acids to the microbial cell or co-precipitation of the free bile acids.^[25-27]
- Anti-carcinogenic, antimutagenic and anti-allergic activities.^[28-30]
- Production of H₂O₂ by probiotics promotes epithelial restitution.^[31]
- Production of antimicrobial agents, organic acids and bacteriocins stimulates the production of intestinal mucins which will prevent the implantation of pathogens.^[32]
- Their action on the intestinal immune system by stimulating the receptors of innate immunity, TLRs which will cause the production of pro-inflammatory cytokines and lead to the initiation of phagocytosis by macrophages.^[33]

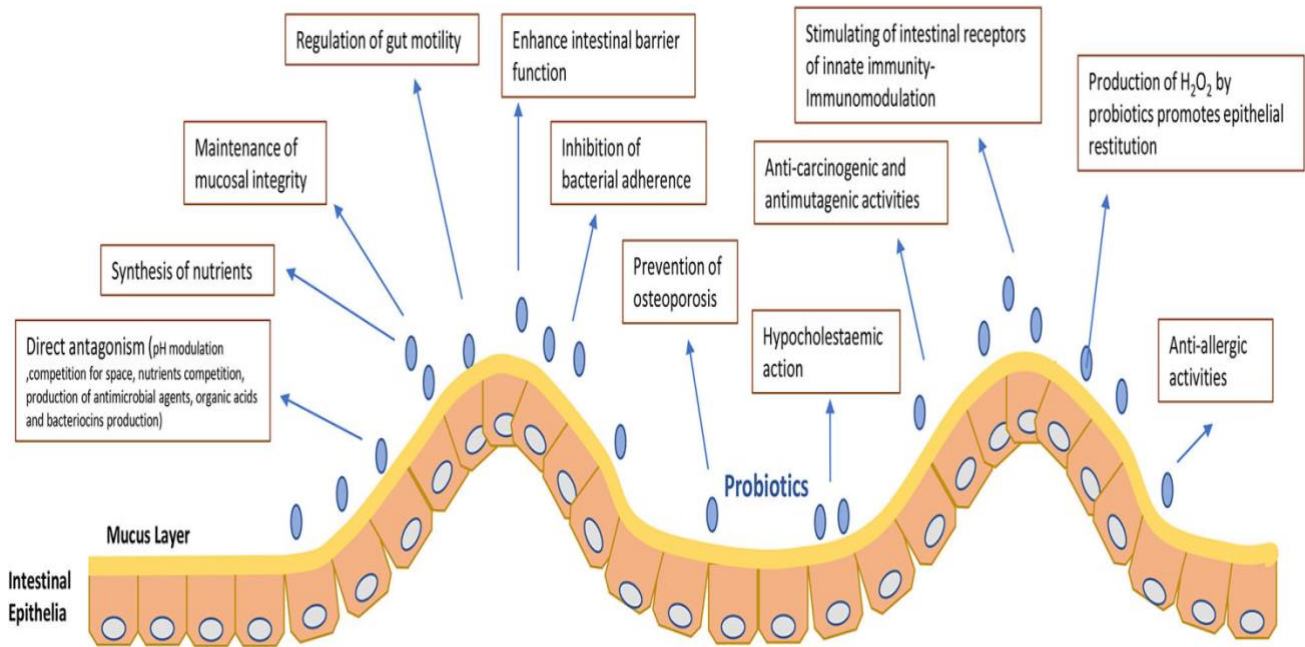


Figure 1.1. Mechanism of action of probiotics

Source: Stavropoulou, 2020.^[19]

2.7. Prebiotics and their role

Prebiotics are short-chain carbohydrates (SCCs) that are non-digestible by digestive enzymes in humans and that have been called resistant SCCs. They shift to the colon and are then selectively fermented.^[34] The benefit to the host is mediated during selective stimulation of the growth and/or activity of one or a limited number of bacteria.^[15]

According to Al-Sheraji SH et al., the role of prebiotics is played by fermentable carbohydrates, which stimulate, preferentially, the growth of probiotic bacteria, thus enhancing the gastrointestinal and immune systems. In addition, prebiotics have been shown to increase the absorption of calcium and magnesium, influence blood glucose levels and improve plasma lipids, and to reduce the risk of colonic cancer.^[35] The mixtures of probiotics and prebiotics

are often used in order to take advantage of their synergic effects in application to food products. Thus, these mixtures are called synbiotics.^[35]

2.8. Safety issues

Consumption of over-the-counter probiotics for promotion of health and well-being has increased worldwide in recent years. However, although probiotic use has been greatly popularized among the general public, there are conflicting clinical results for many probiotic strains and formulations. Emerging insights from microbiome research enable an assessment of gut colonization by probiotics, strain-level activity, interactions with the indigenous microbiome, safety and impacts on the host, and allow the association of probiotics with physiological effects and potentially useful medical indications.^[36]

In spite of promised benefits of probiotics, neither the FDA, nor the EFSA have approved the use of probiotics for preventing or treating health issues, despite their classification as safe food supplements.^[37,38] Both authorities have punctuated the faulty characterization and health claims, the scarcity of an efficient explanation of their mechanism of action as well as the failing of considerable studies in humans to really show a benefit of the probiotics' administration.^[19] However, the Japanese Ministry of Health and Welfare seems to have a different policy. FOSHU label (Food for Specified Health Use) is given to a specific probiotic product allowing health claims.^[39]

Regretfully, despite the fact that some clinical trials related to the health benefit claims are of high methodological quality and validity, there are also studies of similarly high methodological quality featuring negative or opposing results, collectively leading to conflicting, ambiguous and debatable overall conclusions. To counteract the above

methodological and analytical limitations and to overcome underpowered findings, researchers and clinicians frequently integrate results from multiple studies in the form of systematic reviews and meta-analyses. The use of such tools may be highly useful in revealing general trends; however, it may also be susceptible to biases that can be introduced in each analytical step, such as the inclusion of outlier studies that dominate the collective results and obscure actual effects, or the lack thereof.^[40] In particular, meta-analyses concerning probiotics tend, at times, to group studies testing various unrelated supplemented microorganisms under the same umbrella, thereby risking over- or misinterpretation of results.^[41]

Finally, many of the probiotics studies are linked, funded, initiated and endorsed by commercial entities of the probiotic industry or professional lobbying groups that are heavily associated with and funded by the same industry.^[42] This safety profile is mainly based on observations noted in clinical trials assessing probiotics efficacy, rather than safety, as the major outcome.^[36]

While probiotics may be safe in healthy adults, their safety is questionable in very low birth weight neonates; critically ill adult and infant patients.^[43,44] Interestingly, some research denoting that following antibiotic treatment of human individuals, enhanced colonic colonization by probiotic strains was associated with a persistent long-term probiotics-induced dysbiosis, which significantly delayed the reconstitution of both the fecal and the GI mucosal microbiome compared to no intervention following treatment with antibiotics.^[36]

2.9. Previous studies

- **First study: knowledge, attitude and practice in relation to effects of probiotics in food among medical faculty students in a Malaysian public university-by Malaysia, 2016 – by Azman HB.^[1]**

It was a cross sectional study conducted among Faculty of Medicine and Health Sciences students, aimed at determining the level of knowledge, attitude and practice on probiotics. It included 222 respondents. The results indicated that majority of the respondents had poor knowledge (50.5%), negative attitude (56.8%) and poor practice (70.3%) towards probiotics and probiotic food products.

- **Second study: A study to assess the level of awareness about probiotics and their usefulness in MBBS students of a medical college of Meerut-Pradesh, India, 2019- by Agrawal A., et al.^[45]**

It was a cross sectional study aimed at determining the awareness of medical students regarding probiotics. The study was conducted on undergraduate in 2017 and 2018 batches of Subharti Medical College using a semi structured questionnaire. In that study, 49% students were initially aware about probiotics out of which 77% had previously used them. The awareness increased by 24% after giving an audio visual presentation and again administering the questionnaire.

- **Third study: Assessment of Knowledge and Awareness of Probiotics Among the Dental Post-graduate Students- A Questionnaire Study- Maharashtra, India-2022- by Patait MR.^[46]**

It was a cross sectional study. The purpose of the study was to assess knowledge and awareness of probiotics among dental students. A total of 104 dental postgraduate respondents from Maharashtra state were surveyed regarding the knowledge of probiotics. The study includes first, second, and third-year dental students. A questionnaire including 15 questions was used to elicit the responses from the students. The questions were modeled based on those used in previously published studies on the knowledge of probiotics. The questionnaire consisted of 15 questions. Of the 104 students in total, 68.3% of respondents were females, and 31.7% were males. The study reveals 98% of participants are aware of the term probiotics and 94.1% of respondents correctly answered that constituents of probiotics are live microorganisms. More than half of the respondents (52%) had taken probiotics as a therapeutic drug for gastrointestinal purposes, 76.5% of respondents thought it helps in the improvement of oral health. The study concluded that a good level of knowledge was observed among dental students. Most of them were aware of the beneficial effects of probiotics on the human body in terms of food digestion and immunity. However, they still lack the other health benefits of probiotics. Also, there was little less knowledge and clarity about the term prebiotic.

- **Fourth study: Perceptions of Medical Sciences Students towards Probiotics-Iran-2012- by Payahoo et al.^[21]**

The study was conducted to assess the knowledge of medical sciences students as future provider of health information about probiotics in Tabriz, Iran. It was a cross-sectional study carried out on 296 medical sciences students from different faculty majors with mean age of 22±4 years. The students completed two self-administered questionnaires; the one was about the demographic characteristics and the other one with nine closed questions as for knowledge as well as probiotics and their health effects and 2 questions related to availability of probiotic

products. The main findings were that 6% percent of students had poor, 43% acceptable, and 51% good knowledge. Comparison of knowledge result between different major and degree groups revealed that high level of knowledge was among students in nutrition major (42.3%) followed by students in pharmacy major (31.9%). Difference was statistically significant.

- **Fifth study: Awareness and Knowledge about Probiotics among College Students-New Delhi, India-2019- by Sharma R. et al.^[47]**

It was a survey conducted among college students and few other professionals to gather information regarding its awareness. Overall the survey indicated that students were well aware of the meaning of the term probiotics. Majority have learnt it from newspaper or TV. Further, students knew that food and supplements are sources for probiotics but were not familiar with the term prebiotic.

CHAPTER 3: METHODS AND MATERIALS

3.1. Study design

Cross – sectional, questionnaire-based, descriptive study.

3.2. Study duration

Data collected in the period from October 2022 to December 2022.

3.3. Study population

Undergraduate university medical students.

3.4. Inclusion criteria

students in medical specialties, of both genders, and any age, encountered in the period of data collection were included in the study.

3.5. Exclusion criteria

Students of non-medical specialties, and students refused to participate in our study were excluded. In addition to the clinical nutrition students .

3.6. Sampling method

A convenient sample was considered; no special technique was applied, all students available during data collection were invited to be involved in the study.

3.7. Sample size

Sample size was calculated to be 384 participants using “Epi Info” program, based on 50% hypothesized frequency of awareness in the study population, confidence level 95%, power of the study 80%, and design effect one. Our total sample consisted of 536 participants which is higher than minimum required sample.

3.8. Study tool

A structured questionnaire was prepared relying on literature review and study objectives. It was prepared in 2 formats: one was titled as “KAP on probiotics” –without giving any definition of the terminology. Another format was included definition of probiotics term as “beneficial bacteria”.

The questionnaire included questions related to demographic data (age, gender, marital status, level of income, specialty, and study level), a question related to background awareness (hearing about probiotics), 5 questions to evaluate students' knowledge about probiotics, 3 questions to evaluate students' knowledge about prebiotics, 4 questions to evaluate students' attitude towards probiotics, and 4 questions to evaluate students' practice towards probiotics.

3.9. Data collection

After taking a verbal consent and explanation purpose of the study to the students, they were invited to participate in the study willingly. Both forms of questionnaire were distributed on students randomly; no special criteria for selection were applied. The questionnaire was self-administered. An internet-based copy of the questionnaire was prepared using Google forms and sent to students in Whats up groups. Returning filled questionnaires were 118 electronic copies and 418 hard copies.

3.10. Study variables

1-Dependent variables:

Knowledge, attitude, and practice of students regarding probiotics.

2-Independent variables:

- Age of the student
- Gender of the student

- Marital status of the student
- Level of family income of the student
- Specialty of the student
- Study level of the student

3.11. Data Analysis

Statistical Package for the Social Sciences (SPSS) software, version 23 was used for data analysis. Nominal and categorical variables were described by frequencies and percentages. Tables and graphs were used to display data. Chi square test was used to test differences between demographic variables and awareness. The test was considered to be significant if $p \text{ value} < 0.05$.

3.12. Ethical consideration

The proposal was reviewed by the supervisor, and then approval taken from the Clinical Nutrition & Dietetics Department. An approval also obtained from Deanship of each college in UST before distribution of questionnaire on students.

During data collection, the aim of the study was briefly explained to students. A verbal consent obtained from each one before starting asking questions and filling questionnaire. They were also informed that data will be used merely for the purpose of research and will be treated confidentially and no indicative information - like names - will be disseminated.

3.13. Dissemination of the results

The study will be presented to UST team as a partial fulfillment of bachelor's degree in clinical nutrition & dietetics. The study also might be useful for interested researchers and related agencies. It could be shared with students, dietitians, doctors, and pharmacists.

CHAPTER 4: RESULTS AND DISCUSSION

Current study included 536 students of different medical sciences. A version of questionnaire containing a simple definition for probiotics through adding the phrase “beneficial bacteria” was distributed to 410 (76.5%) of students. The remaining 126 (23.5%) students received a questionnaire labeled by “probiotics” without mentioning the phrase “beneficial bacteria”.

4.1. Distribution of the sample according to age

Table (4.1) & figure (4.1) show that most of students (75.9%) are in the age group between 20 and 25 years which is the usual age of undergraduate students. However, 20.5% of them are less than 20 years and 3.5% are more than 25 years. This result is in agreement with result by Agrawal et al., where 90.1% of their sample was under 25 years.^[45] Similarly, Arshad et al., found that more than half (53.1%) of surveyed sample were under 25 years.^[48]

Table 4. 1. Distribution of the sample according to age

Age groups	Count	Percent
Less than 20 years	110	20.5%
From 20 to 25 years	407	75.9%
More than 25 years	19	3.5%
Total	536	100%

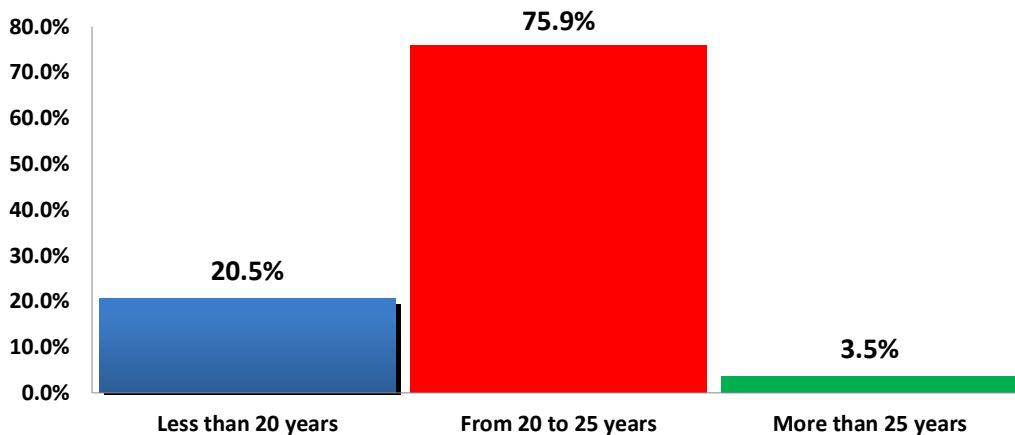


Figure 4. 1. Distribution of the sample according to age

4.2. Distribution of the sample according to gender

Table (4.2) & figure (4.2) show that out of 536 students in the sample, males represented 44.6%, while females represented 55.4%, with males to females ratio 1 : 1.2. And this was because women were more responsive to us . Majority of females respondents (68.3%) also reported by Patait et al.^[46] Likewise, Arshad et al., reported that 55.6% of respondents were females^[48]. This might indicate that females are more interested in issues related to nutrition.

Table 4. 2. Distribution of the sample according to gender

Gender	Count	Percent
Males	239	44.6%
Females	297	55.4%
Total	536	100%

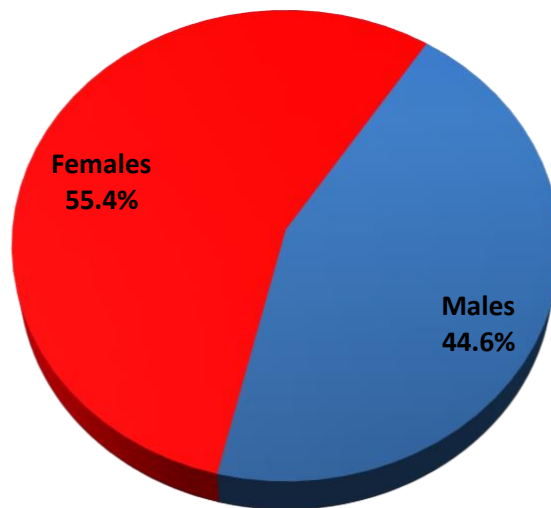


Figure 4. 2. Distribution of the sample according to gender

4.3. Distribution of the sample according to marital status

As shown in table (4.3) and figure (4.3), most of the participants (88.1%) are not married. This rate of marriage is lower than 25.4% reported in a study in Pakistan by Arshad et al.^[48] That is because their sample included both undergraduate and postgraduate health professionals and our sample included only undergraduate students.

Table 4. 3. Distribution of the sample according to marital status

Marital status	Count	Percent
Single	472	88.1%
Married	64	11.9%
Total	536	100%

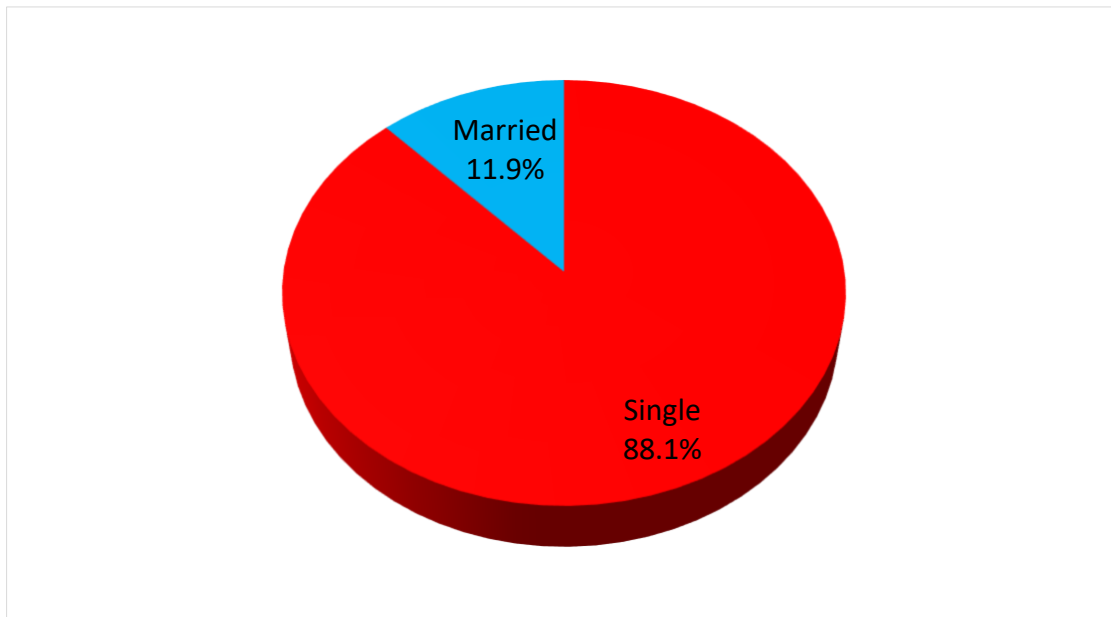


Figure 4. 3. Distribution of the sample according to marital status

4.4. Distribution of the sample according to family income

As shown in table (4.4) and figure (4.4), most of students (81.7%) are coming from families with middle income. The remaining students are either of low income (5.4%), or high income (12.9%). And this may be because the samples were included students from public university (parallel system) and students from private universities. In fact, this result may not reflect the actual economic status for general Yemeni population. According to previous reports, about 80% of Yemenis are in need of humanitarian assistance, with about 7.3 million persons severely food insecure, and 3.3 million persons internally displaced.^[49-51] As of 2019, Yemen was ranked 177th out of 189 countries on the human development index.^[52] Most of Yemeni population lives under poverty line.^[53-55]

Table 4. 4. Distribution of the sample according to family income

Family income	Count	Percent
Low	29	5.4%
Middle	438	81.7%
High	69	12.9%
Total	536	100%

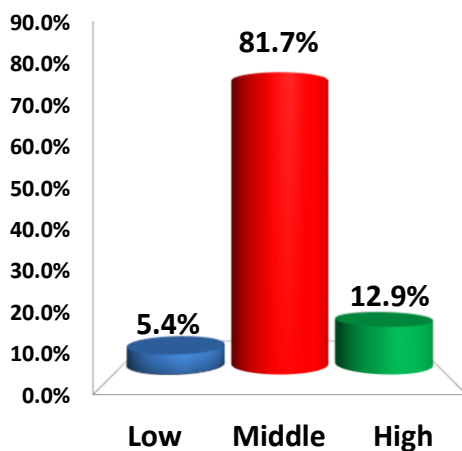


Figure 4. 4. Distribution of the sample according to family income

4.5. Distribution of the sample according to specialty

Participants in our study are distributed among different specialties in varying rates. They are mainly in dentistry (29.3%), medicine (22.8%), laboratories (21.8%), and pharmacy (17.9%). Other specialties include nursing (6.3%), and radiology (1.9%) as shown in table (4.5) & figure (4.5). The high percentage of dental students may be due to the fact that they were more present in the universities and more cooperative. And in contrast to our sample which contains several medical specialties, study by Patait & colleagues included dental students only.^[46] Study by Payahoo et al., included similar specialties but in different proportions which were medicine, pharmacy, dental, nutrition, nursing, health, midwifery, and paramedical in rates of 16.9%, 15.9%, 17.3%, 8.8%, 10.8%, 10.5%, and 8.5% respectively.^[21]

Table 4. 5. Distribution of the sample according to specialty

Specialty	Count	Percent
Dentistry	157	29.3%
Medicine	122	22.8%
Laboratories	117	21.8%
Pharmacy	96	17.9%
Nursing	34	6.3%
Radiology	10	1.9%
Total	536	100%

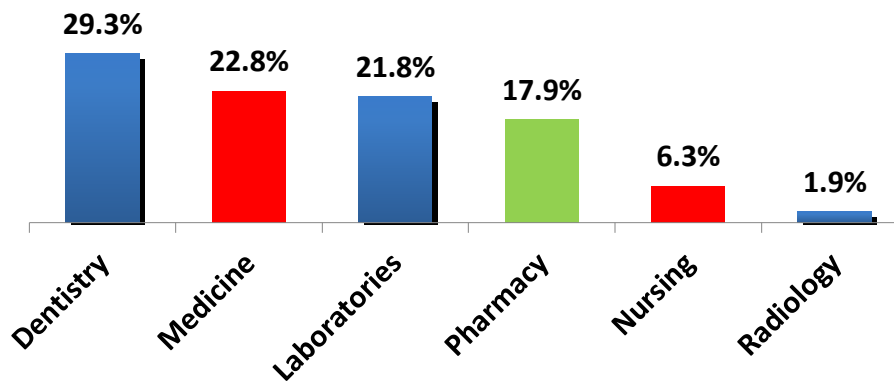


Figure 4. 5. Distribution of the sample according to specialty

4.6. Distribution of the sample according to study level

Table (4.6) & figure (4.6) show that participants are mainly distributed in second, third, and fourth study levels in rates of 32.1%, 28.5%, and 15.1% respectively. Fewer students are in first, fifth, and sixth levels who represented 8.8%, 12.9%, and 2.6% respectively. Students in first level may be not interested in the subject of the study, and students of fifth and sixth level are usually busy by training in hospital and not available in studying halls, and failing out to reach these levels ; therefore, they represented low proportion in the sample.

Table 4. 6. Distribution of the sample according to study level

Study level	Count	Percent
First level	47	8.8%
Second level	172	32.1%
Third level	153	28.5%
Fourth level	81	15.1%
Fifth level	69	12.9%
Sixth level	14	2.6%
Total	536	100%

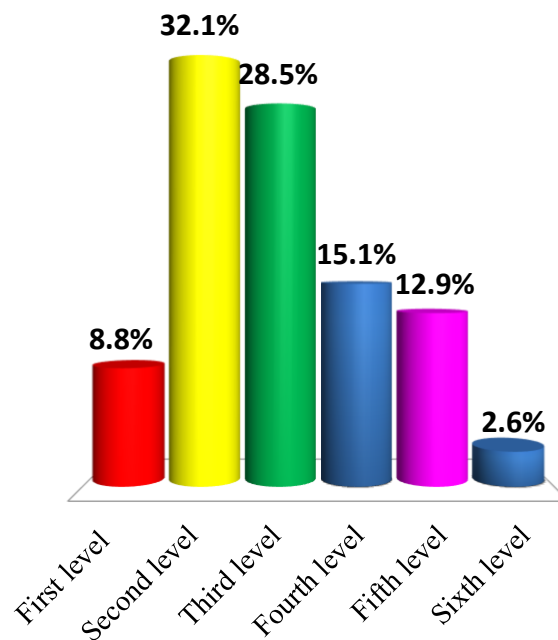


Figure 4. 6. Distribution of the sample according to study level

4.7. Awareness on probiotics according to presence or absence of definition

Table (4.8) & figure (4.8) show that the rate of awareness was 8.4% among those students answered the questionnaire not included definition of probiotics. This rate increased to 58.8% among those given the definition of probiotics. The difference is statistically significant (p value <0.05). This indicates that adding definition to the term will increase the understanding among respondents, and it might be due to using of other term referring this type of bacteris such as beneficial bacteria

Table 4. 7. Awareness on probiotics according to presence or absence of definition

Definition Awareness	Aware	Unaware	Total	P value
Without definition	45 (8.4%)	81 (15.1%)	126 (23.5%)	<0.001
With definition	315 (58.8%)	95 (17.7%)	410 (76.5%)	
Total	360 (67.2%)	176 (32.8%)	536 (100%)	

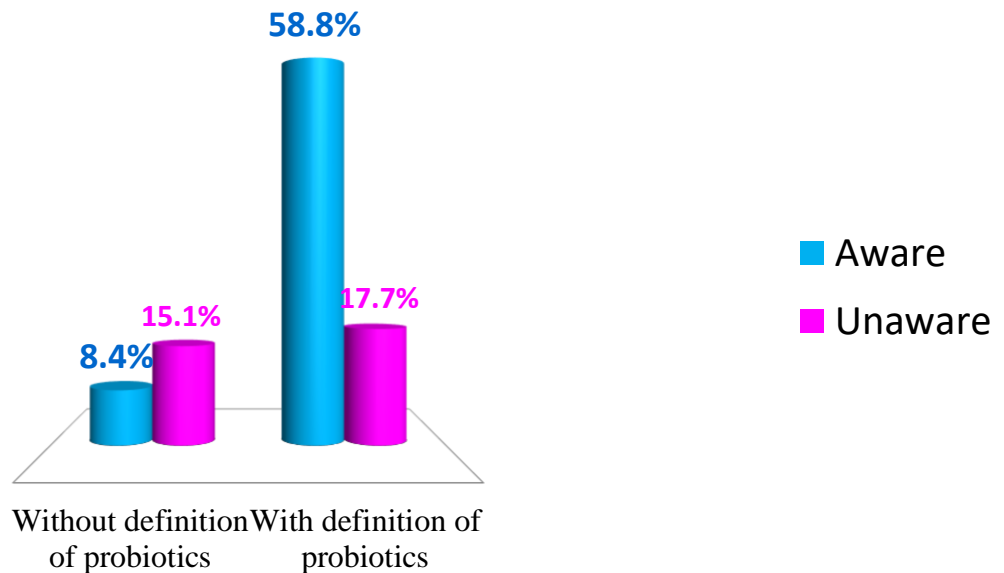


Figure 4. 7. Awareness on probiotics in presence or absence of definition

4.8. Overall awareness on probiotics

As shown in table (4.7) & figure (4.7), two thirds (67.2%) of participants are aware on probiotics as they heard about it before, and it might be due to using of other term referring this type of bacteris such as beneficial bacteria. This result is consistent with Philip et al., who found that 66% of students were aware of term probiotics.^[56] On the other hand, this level of awareness is higher than 50.5% reported in a Malaysian study by Azman H.^[11] In a Saudi study by Hasosah M. et al., among peditricians, only 57.7% were aware of the probiotics.^[57] However, a higher level of awareness was reported in a study in India by Patait & colleagues whose results revealed that 98% of participants had heard of the term probiotics.^[46]

Table 4. 8. Overall awareness on probiotics

Overall awareness	Count	Percent
Aware	360	67.2%
Unaware	176	32.8%
Total	536	100%

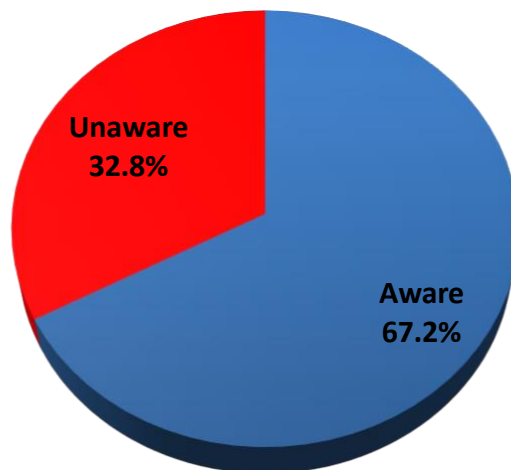


Figure 4. 8. Overall awareness on probiotics

4.9. Awareness on probiotics according to gender

Table (4.9) & figure (4.9) show that the rate of females have awareness is more than rate of males (42.5% vs 24.6%). This might indicate that females are more interested in issues related to nutrition. The difference is statistically significant (p value <0.05). This result is consistent with Bogue study as females were significantly more aware than males.^[58] On the opposite, Sharma et al., found no significant difference in awareness between males and females.^[47]

Table 4. 9. Awareness on probiotics according to gender

Gender \ Awareness	Aware	Unaware	Total	P value
Males	132 (24.6%)	107 (20.0%)	239 (44.6%)	<0.001
Females	228 (42.5%)	69 (12.9%)	297 (55.4%)	
Total	360 (67.2%)	176 (32.8%)	536 (100%)	

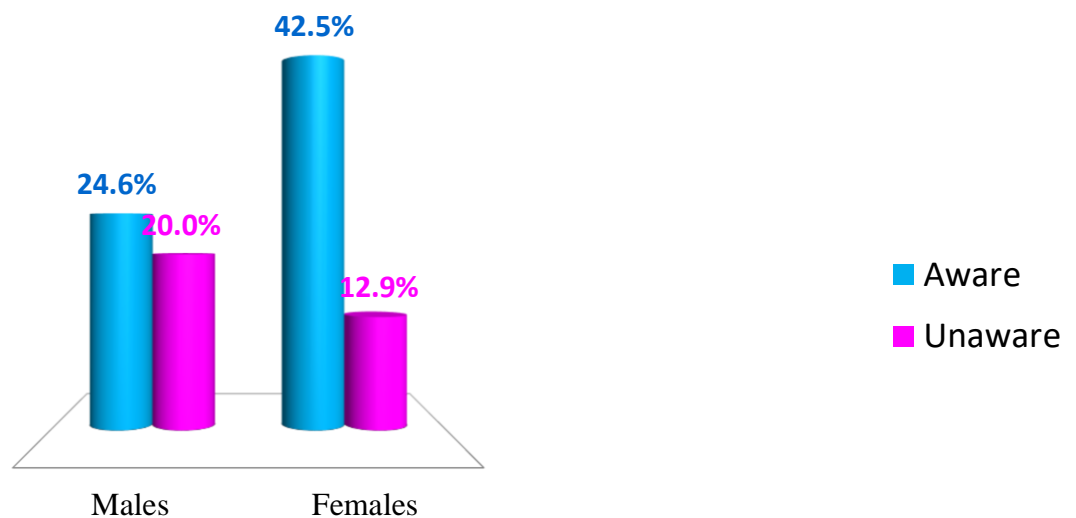


Figure 4. 9. Awareness on probiotics according to gender

4.10. Awareness on probiotics according to age

Table (4.10) & figure (4.10) show that students between 20 and 25 years in age have more awareness than students in other age categories. This might be attributed to the more exposure of this age group to information available in curriculum. However, the difference is not statistically significant (p value >0.05). Similarly, other studies reported no association between age and awareness on probiotics.^[47,48]

Table 4. 10. Awareness on probiotics according to age

Age \ Awareness	Aware	Unaware	Total	P value
Less than 20 years	67 (12.5%)	43 (8.0%)	110 (20.5%)	0.293
From 20 to 25 years	280 (52.2%)	127 (23.7%)	407 (75.9%)	
More than 25 years	13 (2.4%)	6 (1.1%)	19 (3.5%)	
Total	360 (67.2%)	176 (32.8%)	536 (100%)	

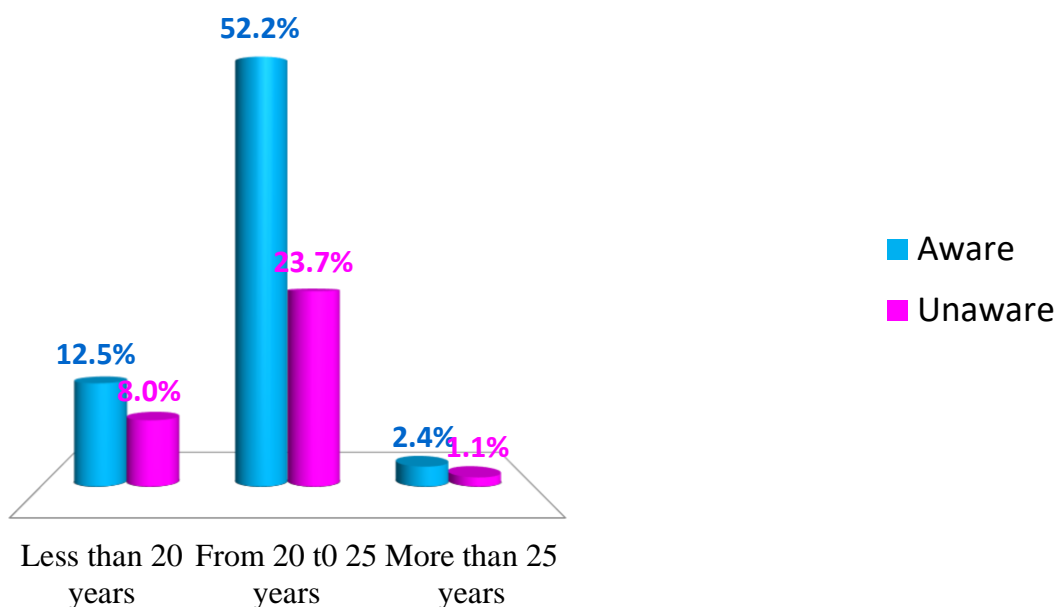


Figure 4. 10. Awareness on probiotics according to age

4.11. Awareness on probiotics according to specialty

Table (4.11) & Figure (4.11) shows that students of dentistry have more awareness, followed by laboratories, medical, and pharmacy students in rates of 21.1%, 16%, 12.9%, and 11.4% respectively. Dentistry students were the highest in awareness, because they studied about beneficial bacteria in their courses, and the radiology students were the lowest in awareness because the beneficial bacteria weren't included in their courses. The difference is statistically significant (p value <0.05). This result is not in agreement with Payahoo et al., who found that students in nutrition program and students in pharmacy program had the highest levels of knowledge which were 42.3%, and 31.9% respectively.[20] Sharma et al., reported a different result that medical students had highest knowledge scores, whereas nutrition students had lowest knowledge scores.[44]

Table 4. 11. Awareness on probiotics according to specialty

Specialty	Awareness	Aware	Unaware	Total	P value
Dentistry		113 (21.1%)	44 (8.2%)	157 (29.3%)	0.021
Laboratories		86 (16.0%)	31 (5.8%)	117 (21.8%)	
Medicine		69 (12.9%)	53 (9.9%)	122 (22.8%)	
Pharmacy		61 (11.4%)	35 (6.5%)	96 (17.9%)	
Nursing		26 (4.9%)	8 (1.5%)	34 (6.3%)	
Radiology		5 (0.9%)	5 (0.9%)	10 (1.9%)	
Total		360 (67.2%)	176 (32.8%)	536 (100%)	

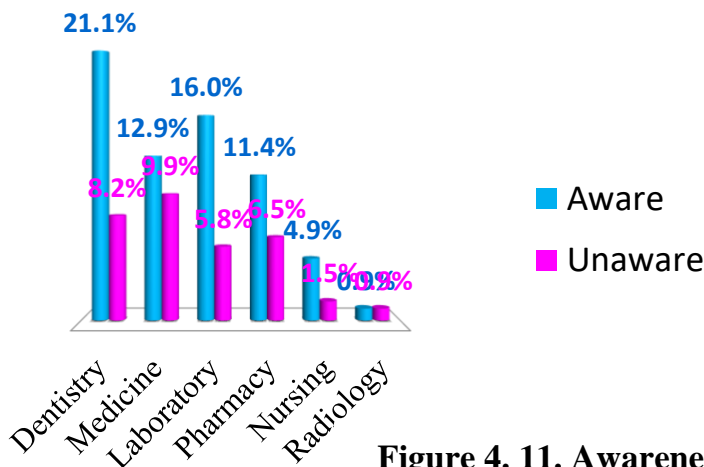


Figure 4. 11. Awareness on probiotics according to specialty

4.12. Source of information

As shown in Table (4.12) figure (4.12), sources of information on probiotics were lectures (39.9%), because the samples were university students . Doctors (13.6%), websites (7.5%), and social media (6.2%) was the lowest because the social media don't care about nutrition a lot. This result is somewhat different from that in a previous study as information got from doctors (44.1%), social media (12.7%), and internet (43.1%).[43]

Table 4. 12. Source of information

Source of information	Count	Percent
Lectures	214	39.9%
Doctors	73	13.6%
Websites	40	7.5%
Social media	33	6.2%
I have no idea	176	32.8%
Total	536	100%

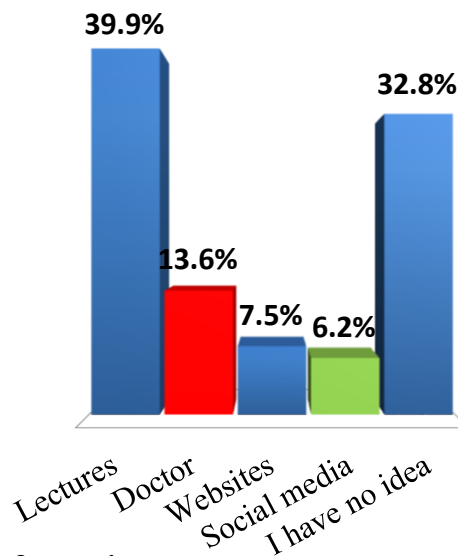


Figure 4. 12. Source of information

4.13. Knowledge about probiotics

As shown in table (4.13), only 55% of students know correct answer about nature of probiotics which is living organisms, 12.7% chose that probiotics are better to be derived from foods and drinks, 40.1% know correct method (orally) of taking probiotics, and 52.2% chose correct answer of probiotics source which is dairy products. This result is not consistent with result in a previous study in which 94.1% of respondents believed that dairy products like milk and yogurt were sources of probiotics.^[46] However, rate of correct answer regarding sources of probiotics was low (33%) as reported by Philip et al.^[56]

Regarding health benefits of probiotics, a small proportion of students in this study chose protection from diabetes and protection from hypertension in rates of 0.6% and 1.3% respectively. Others chose improvement of digestion and improvement of immunity in rates of 18.3%, and 11.4% respectively. The most frequent choice was “all of the above” which chosen by 25.7% of students. These findings are different from those in a previous study in which 68.6% of respondents believed that consumption of probiotics can improve food digestion and 29.4% thought that taking probiotics can increase immunity, and only 2% believed that probiotics were beneficial to decrease the risk of diabetes, but none of the respondents selected probiotic is beneficial to decrease the risk of hypertension.^[46] In general, this indicates the importance of taking courses on nutrition to improve knowledge about probiotics among medical students.

Table 4. 13. Knowledge about probiotics

Question	Count	Percent
What is the nature of probiotics?		
Living organisms	295	55%
Herbs products	45	8.4%
Synthetic drugs	20	3.7%
I don't know	176	32.8%
Probiotics are better to be derived from:		
Foods and drink	68	12.7%
Dietary supplements	150	28.0%
I don't know	318	59.3%
How probiotics are taken?		
Oral	215	40.1%
Intravenous	12	2.2%
Both	47	8.8%
I don't know	262	48.9%
What are sources of probiotics?		
From dairy products	280	52.2%
Extracted from animals	16	3.0%
From grains	2	0.4%
Fruits and vegetables	15	2.8%
I don't know	223	41.6%
What are possible benefits of taking probiotics?		
Protection from diabetes	3	.6%
Protection from hypertension	7	1.3%
Improvement of digestion	98	18.3%
Increase immunity	61	11.4%
All of the above	138	25.7%
I don't know	229	42.7%

4.13. Knowledge about prebiotics

Regarding knowledge about prebiotics, table (4.14) shows that only 15.9% of students heard about it, and only 6.5% know correct answer, which is "prebiotics are high-fiber diet that acts as food for microflora". A combination between probiotics and prebiotics is called synbiotics, which is known by only 2.2% of students.

And this is maybe because of low information about prebiotic in public media, lectures, and low interest about nutritional topics through medical students. This level of knowledge is lower than that reported in a previous study as 45.1% of respondents were aware while 54.9% were unaware about it.[43]

Table 4. 14. Knowledge about prebiotics

Question	Count	Percent
Did you hear about prebiotics?		
Yes	85	15.9%
No	451	84.1%
What is the nature of prebiotics?		
High-fiber diet that act as food for microflora	35	6.5%
Active good bacteria already living in gut	25	4.7%
All of the above	25	4.7%
I don't know	451	84.1%
Therapeutic combination of probiotics and prebiotics is called:		
Macrobiome	37	6.9%
Synbiotics	12	2.2%
All of the above	11	2.1%
I don't know	476	88.8%

4.14. Attitude toward probiotics

As shown in table (4.15), there is 47.8% of students think that use of probiotics is safe, 58.2% think that probiotics have health benefits, 34% think that they are good for oral health, and 38.2% intend to advise their patients to use probiotics.

And this is due to lack of information about beneficial effect of probiotic such as antimicrobial action, improved lactose metabolism, anti-mutagenic properties, prevention of cancer, lowering of serum cholesterol, anti-diarrhoeal properties, immune system stimulation, anti-hyperglycemia and hypertension properties, improved mineral absorption, reduction in inflammatory gut infection and inhibition of *Helicobacter pylori*.^[20]

Similarly, Azman H. reported low positive attitude among students which was 43.2% while negative attitude found in 56.8% of his students.^[1] On the opposite, Patait & colleagues reported high positive attitude, for example, 76.5% of their respondents thought probiotics helps in the improvement of oral health.^[46]

Table 4. 15. Attitude toward probiotics

Question	Count	Percent
Do you think that use of probiotics is safe?		
Yes	256	47.8%
No	36	6.7%
I don't know	244	45.5%

Do you think that probiotics have health benefits?		
Yes	312	58.2%
No	5	0.9%
I don't know	219	40.9%
Do you think that probiotics are good for oral health?		
Yes	182	34.0%
No	30	5.6%
I don't know	324	60.4%
Will you advice your patients to use probiotics?		
Yes	205	38.2%
No	33	6.2%
I don't know	298	55.6%

4.15. Practice toward probiotics

Regarding practice toward probiotics, table (4.16) shows that 52.2% mentioned that they take food rich with probiotics. They take them daily (13.6%), or thrice per week (22.9%), or once per week (1.3%). And this is maybe due to lack of sources of probiotic in our country, and the high price of it which make it difficult for people to consume it regularly. Generally, these findings indicate poor practices which are consistent with findings by Azman H. who reported that 70.3% of students had poor practices.[1] However, a previous study reported a better practices as 82.4% respondents reported personally having consumed food with probiotics; 31% consumed it for once a day, 28.6% for 2-3 times/week, 20.2% once a week, and 7.1% rarely consumed food with probiotics.[43] In this study, 19% of students mentioned that they had used probiotics as a therapy for digestive disease, 4.5% used them for autoimmune disease, and 2.2% used them for oral health. In 21.6% of students the probiotics were useful when taken as therapy. This rate of using is lower than that reported in a previous study where 52% of student had taken probiotics as a therapeutic drug for gastrointestinal purposes, 6.9% for oral health, 2% for cardiac disease, and 1% for autoimmune conditions.[43]

Table 4. 16. Practice toward probiotics

Question	Count	Percent
Do you usually take foods rich with probiotics?		
Yes	280	52.2%
No	80	14.9%
I don't heard about probiotics	176	32.8%
If yes, what is the frequency of taking?		
Daily	73	13.6%
Nearly 3 times per week	123	22.9%
Once per week	64	11.9%
Once per month	7	1.3%
Seldom	13	2.4%
Never used them	80	14.9%
I don't heard about probiotics	176	32.8%
Have you been used probiotics as a therapy for the following conditions?		

Digestive problems	102	19.0%
Autoimmune disease	24	4.5%
Oral health	12	2.2%
Cardiovascular disease	2	0.4%
I didn't used them for therapy	396	73.9%
Was probiotics therapy useful for you?		
Yes	116	21.6%
No	24	4.5%
I didn't used them for therapy	396	73.9%

CHAPTER 5: CONCLUSION

In conclusion, probiotics are new emerging products that gain more and more attention in health field, and this study highlights awareness of students in medical programs about probiotics. One third of students are not aware about probiotics.

Gender and specialty program are predictors that influence awareness and knowledge of students. Students mainly get their knowledge about probiotics from information during studying in the university. Knowledge, attitude, and practice on probiotics are relatively low.

In general, nearly less than half of students were aware of the beneficial effects of probiotics on food digestion and immunity. Although most of them knew that dairy products were food sources of probiotics, consumption of dairy products still weak. Poor knowledge and less clarity regarding prebiotics have been found in this study.

CHAPTER 6: RECOMMENDATIONS

- Health education using available media can be used to address information about probiotic products as well as to promote the increased awareness of probiotic consumption.
- Topic of probiotics should be incorporated in the university curriculum of all medical programs including pharmacy and dentistry, so that future practitioners may have better knowledge and practices regarding the use of probiotics.
- Further studies are warranted for identification of gaps in knowledge and practice, which will help in developing educational materials for students about probiotics.

Strengths and limitations of this study

Strengths include:

- The sample was large enough to conduct statistical analysis and comparison, and to get inferential information.
- A pilot study was conducted “before introducing the definition of probiotics term in the title”.
- The participants were randomly selected and the questionnaire was self-administered after explaining the aims of the study to the participants.

Limitations include:

- Convenient sampling was used and data had been collected from Sana'a only, which could affect the generalizability of the results.
- Limitations in time and resources.

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APPENDIX: THE QUESTIONNAIRE

ان هذا الاستبيان يهدف الى تقييم المعرفة والسلوك والممارسات لطلبة كلية الطب والعلوم والصحية حول البروبيوتك (البكتيريا النافعة)

ولا شك ان تعاونكم معنا سيكون له الأثر البالغ لتحقيق الهدف المنشود من هذه الدراسة

لذا نرجو منكم التكرم بإعطاء المعلومات على النقاط المذكورة ادناه ومع رغبتنا في تعاونكم الكريم فإننا حريصون على ان المعلومات الواردة في الاستبيان لن تستخدم الا لغرض البحث العلمي ولن يتم التطرق الا للنتائج العامة بمنتهى السرية ولكم كامل الحرية في المشاركة او الاعتذار عن المشاركة دون تحمل أي تبعات

مع خالص الشكر والتقدير ,,
الباحثون :طالبات قسم التغذية العلاجية والحميات
جامعة العلوم والتكنولوجيا.

الرجاء وضع دائرة حول الإجابة التي ترغب باختيارها:

البيانات التعريفية:

• العمر :

1. أقل من 20
2. من 20 الى 25
3. أكثر من 25

• الجنس :

1. ذكر
2. أنثى

• الحالة الاجتماعية :

1. عازب/ة
2. متزوج/ة

• مستوى دخل رب الأسرة :

1. منخفض
2. متوسط
3. عالي

• التخصص :

1. طب بشري
2. صيدلة
3. أسنان
4. مختبرات
5. أشعة
6. تمريض

• المستوى الدراسي:

1. الأول
2. الثاني
3. الثالث
4. الرابع
5. الخامس
6. السادس

(1) هل سمعت بمصطلح البروبيوتك (البكتيريا النافعة) :

- نعم
- لا

(2) إذا كان الاجابة بنعم فمن اين حصلت على معلوماتك :

- أطباء
- وسائل التواصل الاجتماعي
- الانترنت
- اثناء سماعك للمحاضرات
- لم احصل على معلومات

3) برأيك ماهي طبيعة البروبيوتك (البكتيريا النافعة):

- كائنات حية دقيقة
- أدوية اصطناعية
- منتجات نباتية طبيعية
- لا أعرف

4) استهلاك البروبيوتك (البكتيريا النافعة) أفضل من:

- الغذاء والمشروبات
- المكملات الغذائية
- لا أعرف

5) قد يتم اعطاء البروبيوتك (البكتيريا النافعة) :

- فموي
- وريدي
- كل ما سبق
- لم أعرف

6) ماهي مصادر البروبيوتك (البكتيريا النافعة) :

- الحليب والزبادي
- مصادر حيوانية
- الحبوب
- الفواكه والخضروات
- لا أعرف

7) هل تعتقد ان استهلاك البروبيوتك (البكتيريا النافعة) آمن:

- نعم
- لا
- لا أعرف

8) هل تعتقد ان البروبيوتك (البكتيريا النافعة) لها دور صحي :

- نعم
- لا
- لا أعرف

9) هل سوف تنصح بالبروبيوتك (البكتيريا النافعة) لمرضاك مستقبلا :

- نعم
- لا
- لا أعرف

10) هل تستهلك المنتجات الغذائية الغنية بالبروبيوتك (البكتيريا النافعة) :

- نعم
- لا
- لا أعرف

11) إذا كانت الاجابة بنعم فما هو مدى استهلاكك:

- مره واحده يوميا
- 2الى 3 مرات اسبوعيا
- مرة واحده اسبوعيا
- مرة واحده شهريا
- نادرا
- لم استهلك

12) هل استخدمت البروبيوتك (البكتيريا النافعة) كدواء علاجي لأي من الاغراض التالية :

- المناعة الذاتية
- الجهاز الهضمي
- القلب
- الصحة الفموية
- لم تستخدم قط

13) هل كانت البروبيوتك (البكتيريا النافعة) مفيدة لك:

- نعم
- لا
- لم استخدم
-

14) أي من الفوائد الصحية التالية يمكن أن تأخذ من استهلاك البروبيوتك (البكتيريا النافعة):

- انخفاض خطر الاصابة بمرض السكري
- انخفاض خطر ارتفاع ضغط الدم
- تحسين هضم الطعام
- زيادة الصحة المناعية

- كل ما سبق
 - لا شيء مما سبق
 - لا أعرف
- (15) هل تعتقد ان البروبيوتك (البكتيريا النافعة) يمكن أن يحسن من صحة الفم:
- نعم
 - لا
 - لا أعرف
- (16) هل أنت على علم بالبروبيوتك وكيف تختلف عن البروبيوتك (البكتيريا النافعة) :
- نعم
 - لا
- (17) البروبيوتك هي :
- من ألياف النباتات المتخصصة التي تعمل كغذاء للبكتيريا الجيدة
 - تحفز نمو البكتيريا الجيدة الموجودة مسبقا
 - كلاهما
 - لا أعرف
- (18) استخدام البروبيوتك مع البروبيوتك (البكتيريا النافعة) لغرض علاجي يدعى ب :
- **Macrobiome**
 - **Synbiotics**
 - كل ما سبق
 - لا أعرف

الملخص العربي

الخلفية:

خلال العقدين الماضيين، أصبحت بكتيريا البروبيوتيك (بكتيريا نافعة – معينات حيوية) شائعة بشكل متزايد نتيجة لتراكم الأدلة العلمية التي تشير إلى أثارها المفيدة على صحة الإنسان. تم دمج البروبيوتيك في العديد من المنتجات، وخاصة منتجات الألبان المخمرة. ومع ذلك، من المتوقع أن تكون المعارف والممارسات بشأن البروبيوتيك منخفضة بين السكان اليمنيين بما في ذلك طلاب الجامعات بسبب التعرض المحدود لمعلومات البكتيريا النافعة.

هدف الدراسة:

تحديد المعارف والمواقف والممارسات للطلاب في البرامج الطبية فيما يتعلق بالبروبيوتيك.

منهجية الدراسة:

دراسة وصفية مقطعية مستعرضة قائمة على الاستبيان. تم إعداد الاستبيان بالاعتماد على مراجعة الأدبيات وعلى أهداف الدراسة. تم إعداد نسخة من الاستبيان عبر الإنترنت باستخدام نماذج جوجل وإرسالها إلى الطلاب من خلال برنامج واتس اب.

تضمن الاستبيان أسئلة تتعلق بالبيانات الديموغرافية (العمر والجنس والحالة الاجتماعية ومستوى الدخل والتخصص ومستوى الدراسة)، سؤال يتعلق بالوعي الرئيسي (السماع عن البروبيوتيك)، خمسة أسئلة لتقييم معارف الطلاب حول البروبيوتيك، ثلاثة أسئلة لتقييم معارف الطلاب حول البريبايوتك، وأربعة أسئلة لتقييم موقف الطلاب تجاه البروبيوتيك، وأربعة أسئلة لتقييم ممارسات الطلاب تجاه البروبيوتيك. تم جمع البيانات في الفترة من أكتوبر 2022 إلى ديسمبر 2022.

استخدم برنامج الإحصاء للعلوم الاجتماعية (SPSS, IBM Inc. version 23)، لتحليل البيانات. تم عرض البيانات في جداول ورسوم بيانية، وتم تلخيصها في قيم ونسب مئوية ومتوسطات وانحرافات معيارية. استخدم اختبار مربع كاي (Chi square) لاختبار الفروق بين الفئات، واعتبر الاختبار ذو دلالة احصائية إذا كانت قيمة "پ" أقل من 0.05

نتائج الدراسة:

شملت الدراسة 536 طالبا وطالبة من مختلف العلوم الطبية. تمثل الإناث الغالبية (55.4%) ومعظم الطلبة (75.9%) في الفئة العمرية بين 20 و 25 سنة، موزعون على التخصصات المختلفة وهي طب الأسنان (29.3%)، الطب (22.8%)، المختبرات (21.8%)، والصيدلة (17.9%). وتشمل التخصصات الأخرى التمريض (6.3%) والأشعة (1.9%). وتتوزع بشكل رئيسي في مستويات الدراسة الثاني والثالث والرابع بنسب 32.1% و 28.5% و 15.1% على التوالي، ونسبة أقل في المستويات الأول والخامس والسادس بنسبة 8.8% و 12.9% و 2.6% على التوالي.

أظهرت النتائج أن الوعي العام ليس عالياً حيث أن 67.2% فقط من الطلاب سمعوا بالفعل عن البروبيوتيك. المصادر الرئيسية للمعلومات كانت المحاضرات (39.9%) والأطباء (13.6%)، تليها المواقع الإلكترونية (7.5%) ووسائل التواصل الاجتماعي (6.2%). صار مستوى الوعي أفضل عند إضافة تعريف لمصطلح البروبيوتيك ككثيراً مفيدة (8.4% قبله مقابل 58.8% بعده). تتمتع الإناث بمستوى وعي أعلى من الذكور (42.5% مقابل 24.6%) دون وجود فرق ذو دلالة إحصائية. كما لم يؤثر العمر على مستوى الوعي. ومع ذلك، يبدو أن التخصص يؤثر على مستوى الوعي لأنه أعلى بشكل ملحوظ بين طلاب طب الأسنان (21.1%) والطب (16%) والصيدلة (12.9%) من التخصصات الأخرى.

أظهرت النتائج أن 55% فقط من الطلاب يعرفون الإجابة الصحيحة عن طبيعة البروبيوتيك كونها كائنات حية دقيقة، و 52.2% أجابوا بشكل صحيح أن المصدر الرئيسي للبروبيوتيك هو منتجات الألبان، و 25% فقط يعتقدون أن البروبيوتيك يمكن أن يكون مفيداً في أمراض السكري وارتفاع ضغط الدم، وعسر الهضم ومشاكل المناعة. كشفت النتائج أيضاً أن معظم الطلاب ليسوا على دراية بمصطلح البروبيوتيك لأن 15.9% منهم فقط سمعوا عن هذا المصطلح.

فيما يتعلق بالموافق، يعتقد 58.2% أن البروبيوتيك لها فوائد صحية، ويعتقد 34% أنها مفيدة لصحة الفم، و 38.2% ينوون نصح مرضاهم باستخدام البروبيوتيك. فيما يتعلق بالممارسة تجاه البروبيوتيك، ذكر 52.2% أنهم يتناولون الأطعمة الغنية بالبروبيوتيك، لكن 13.6% فقط هم الذين يتناولونها بشكل يومي، وتشير هذه النتائج إلى مستوى ممارسات متدني.

الاستنتاجات والتوصيات:

في الختام، تسلط هذه الدراسة الضوء على وعي الطلاب في البرامج الطبية حول البروبيوتيك. وكشفت أن الوعي ليس عالياً، كما أظهرت أن المعرفة، والمواقف، والممارسة على البروبيوتيك منخفضة نسبياً. نوع التخصص هو مؤشر يؤثر على وعي ومعرفة الطلاب.

يوصى بمزيد من التثقيف الصحي باستخدام الوسائط المتاحة لنشر المعلومات حول منتجات البروبيوتيك وكذلك لتعزيز الوعي المتزايد باستهلاك البروبيوتيك. بالإضافة إلى ذلك، يجب إدراج موضوع البروبيوتيك في المناهج الجامعية لجميع البرامج الطبية. كما يوصى بإجراء مزيد من الدراسات لتحديد مناحي القصور في المعارف والممارسات، والتي ستساعد في تطوير المواد التعليمية للطلاب حول البروبيوتيك.

الكلمات المفتاحية: البروبيوتيك، البكتيريا النافعة، منتجات الألبان، الكائنات الحية الدقيقة، العصيات اللبنية،

البيفيدوباكتيريوم، المعرفة، السلوك، الممارسة، طلبة الطب



معارف ومواقف وسلوكيات الطلبة في التخصصات الطبية تجاه استخدام البروبيوتيك (البكتيريا النافعة) – صنعاء، 1444.

بحث مقدم إلى قسم التغذية العلاجية والجُميَّات في كلية الطب والعلوم الصحية، جامعة العلوم والتكنولوجيا،
كجزء من استكمال متطلبات نيل درجة البكالوريوس في التغذية العلاجية والجُميَّات

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2023 م

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